

# **Project 1: Image Filtering and Hybrid Images**

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CSC-414 Introduction to Computer Vision

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# 1 Questions

**Q1: Explicitly describe image convolution: the input, the transformation, and the output. Why is it useful for computer vision?**

Image convolution uses a kernel that is applied to each pixel in the image to create a new image. A kernel is used to view neighboring cells in the image and calculate a new pixel value for the resulting image.

**Q2: What is the difference between convolution and correlation? Construct a scenario that produces a different output between both operations and show some images of the result. (you can use built in correlation functions and convolution functions in scipy here if desired).**

Convolution takes two images and produces a new third image. Convolution is also a mathematical operation that takes two functions and creates a third function. Correlation measures the displacement of one signal relative to the other signal. It measures similarity of two images. Correlation is similar to convolution.

**Q3: What is the difference between a high pass filter and a low pass filter in how they are constructed and what they do to the image? Please provide example kernels and output images.**

The main difference between the two filters is the range of frequency that they allow to pass through them. A high pass filter passes signals with frequencies that are above a certain threshold. A low pass filter passes signals with frequencies that are below a certain threshold. Low pass filters can be created by taking an image and removing or subtracting the high-pass signals from it.